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SOLID WASTE MANAGEMENT MANPOWER PROFILE AND ANALYSIS

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16. Abstracts

The report consists of an analysis of the management manpower involved in solid waste. The analysis will cover the manpower situation at the State level, the local operating level and in the area of resource recovery. The labor-management segment presents the reasons, results and solutions to problems between labor and management, and designs programs to produce incentive in workers. The impact of events on solid waste manpower examines cost pressures, enforcement of air pollution standards and financing of the system. Employment opportunities versus efficiency in management explores the situation of providing jobs while having to meet set environmental quality and efficiency standards. Current training programs are reviewed at local and State levels, in the area of resource recovery, formal and private industry.

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I

INTRODUCTION

The manpower situation of organizations and institutions involved in managing the nation's solid wastes is vastly different from those concerned with other environmental control activities, particularly air and water pollution abatement.

At the local, operating level, for example, solid waste management is unique in its dependency not on plant and equipment, but on manpower. Clearly, water pollution control requires capital intensive solutions, whereas solid waste management is a system in which present technology and economics dictate the traditional approach of waste handling primarily by men and trucks. The extreme labor-intensity of solid waste management is underscored by the fact that roughly 68 percent of the nation's annual expenditures for solid waste management are allocated to salaries, wages and related manpower expenses, while only about 15 percent are allocated to major capital expenditures.[1] Although many solid waste systems could alter their labor-capital ratios in the near term through improved utilization of existing knowledge and technology (as is happening in a number of systems), there are no technological events on the horizon which indicate any radical reversal of the labor intensive nature of solid waste management.

At the State level, manpower differences between solid waste and other environmental control activities are primarily in the number of people involved in support, non-operating types of functions. Solid waste management clearly lags other environmental fields in the number of persons employed in such support activities as planning, training, monitoring, enforcement, technology implementation, and so forth. According to the Second Annual Report of the Council on Environmental Quality, some 2,934 persons are involved in such functions in the water pollution control area and 4,256 in the air pollution control area. This is compared to a total of only 350 (1,044 on a part-time basis) in the solid waste management field.

In recognition of this situation -- and numerous issues contained therein -- Congress mandated in Section 210 of the Solid Waste Disposal Act, as amended, a study to determine:

- the need for additional trained State and local personnel to carry out plans assisted under this act and other solid waste and resource recovery programs;

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[1] In more efficient operations the trend is toward more capital intensiveness, however because of the nature of the service it will never approach the capital intensiveness of waste water treatment, etc.

- means of using existing training programs to train such personnel; and

- the extent and nature of obstacles to employment and occupational advancement in the solid waste disposal and resource recovery field which limit either available manpower or the advancement of personnel in such a field.

This report is in fulfillment of this requirement.

The report itself is divided into several sections: a summary of findings and recommendations; a descriptive profile of total solid waste management manpower; an analysis of the manpower situation and related issues at the State level, at the local operating level, and in the area of resource recovery; a discussion of three particularly important aspects of the solid waste manpower field -- labor-management relations, the impact of various trends or events (e.g., the enactment of pollution control laws, growing pressures on municipal revenues, etc.) on the solid waste manpower situation, and the conflict of efficiency versus job support; and finally, an analysis of existing solid waste manpower training programs.

Some of these sections and much of the analysis presented therein goes beyond the scope of the Congressional mandate as defined in Section 210 of the Solid Waste Disposal Act, as amended by the Congress in the Committee Report accompanying the Resource Recovery Amendments of 1970. These sections address some of the pre-1970 concerns about the character of the industry's manpower. Such concerns include the apparent high rate of vacancies, labor turnover, and absenteeism in the solid waste field, lack of career and advancement opportunities, morale problems, ways of better utilizing the unemployed and under-employed, and the need for upgrading the skills and supply of adequately trained personnel for all levels of local and regional solid waste management.

This report is based primarily on a comprehensive solid waste manpower survey and study conducted for the Office of Solid Waste Management Programs of the Environmental Protection Agency by Applied Management Sciences, Inc. As indicated in the Appendix (see Summary of Survey of Methodology), the survey consisted of extensive interviews with managers and officials of 3300 public and private solid waste operating agencies and 900 employees of the agencies. Selection of these agencies and employees was done on a statistically valid sampling basis. The survey data was complemented by in-depth manpower case studies in Atlanta, Georgia; Tacoma, Washington; Ft. Worth, Texas; Minneapolis, Minnesota; Pittsburg and Hanover, Pennsylvania; and Milwaukee, Wisconsin.

II

SUMMARY OF FINDINGS AND RECOMMENDATIONS

II-A. FINDINGS

Size and Composition of Solid Waste Manpower Force

- There are an estimated 307,000 persons involved in managing the nation's annual solid waste load. Of these, 227,000 (74 percent), are employed at the local level in the direct operation of solid waste management systems. Seventy-nine thousand work in the resource recovery/secondary materials sector. Only 350 persons are employed on a full-time basis at the State level, although 1,044 persons are estimated to spend 50 percent of their time or more performing solid waste related functions at this level.

- Of the 227,000 operating personnel at the local level, 125,000 (55 percent) are employed by 10,678 private contractors, and 102,000 work for 2,982 public (municipal and county agencies. Of this total, 170,000 (75 percent) are involved in the collection function, with the remainder involved in transport, transfer, processing, disposal and other functions. Approximately 80 percent of the total operating personnel at the local level are "direct" employees (involved directly in collection and disposal activities) in skilled and unskilled categories, with the remainder being managerial, clerical and supervisory.

Salaries and Wages

- Although salaries and wages of solid waste personnel at all levels vary according to size and ownership (public or private) of the employing institutions, SMSA size and geographic region, they are relatively consistent with national and regional averages for positions of similar skill, utility and status except secretarial, which are significantly higher than the norm. Private sector employees receive a higher mean gross weekly salary than public employees, which is due not only to unequal pay but a longer work week worked by private sector employees.

Turnover and Absenteeism

- Turnover of solid waste manpower is low in managerial, clerical and supervisory positions but high (40.7 percent) in unskilled positions. When compared to the annual turnover rates for unskilled laborers of other industries (particularly manufacturing), however, the unskilled experience in solid waste is surprisingly low.

- Absenteeism rates for unskilled employees are lower than the national average (6.2 days per man per year for solid waste versus 6.6 nationally). Wide variations in absenteeism rates do exist between different agencies or institutions. Public sector operations experience higher absenteeism than private operations.

Barriers to Entry and Advancement

- No substantial barriers to entry exist in the solid waste field, even when the large number of unskilled jobs in the industry are discounted.

- Racial discrimination and the lack of any substantial career ladder represent significant barriers to advancement in the field. Advancement for all personnel is slowed by the few levels of job categories necessary to perform and manage various tasks associated with solid waste management. Solid waste management is a classic case of a "few jobs at the top" with "thousands at the bottom."

Union/Non-Union

- Union membership patterns for all job categories in the solid waste industry resemble those of other industries. Employees of public operations are union members to a greater degree than private employees at all levels.

- Unions and civil service systems achieve higher salaries, fringe benefits, promotion rates, etc. than exist in systems where these institutions are absent. They also appear, however, to dampen productivity (and thus increase costs) and engender increased absenteeism. No differences in quality of services provided can be factually discerned between union/non-union or civil service/non-civil service systems.

Training

- An adequate supply of persons and skills are available to fill openings when they occur in all sectors of the solid waste field (local operating, State and resource recovery), indicating that training needs are being fulfilled, at least in terms of numerical requirements. This situation is due to the unsophisticated nature of jobs at the lower levels of employment, the type of training required (primarily on-the-job) for a majority of jobs in the industry, the efforts of existing training programs, and the transferability of various skills (e.g., engineering, finance, operations research, heavy equipment, etc.) to the solid waste field.

- Solid waste personnel at the local operating level experience high accident rates and exhibit generally low levels of managerial expertise (even though there are notable exceptions to both of these factors in specific situations). This suggests that while training programs are not necessary to increase the supply of manpower into the solid waste field, specialized training efforts in the management and safety areas might be useful in improving the overall quality of those in the field. If such training efforts are implemented, however, they should be designed as on-the-job programs for those already in the field rather than as pre-training programs for those contemplating a career in solid waste management.

Supply-Demand Relationships

- There is a clear trend toward smaller crews on collection trucks, spurred by the profit motive in the private sector, by financial pressures in the municipal sector, rising labor costs, and supported by developments in collection technology. Consequently, over the near term, it is anticipated that demand for manpower (i.e., the total number of jobs) in the solid waste field will actually decrease, moving the basic equilibrium that currently exists in the manpower supply and demand situation into one of temporary disequilibrium (over-supply) in specific situations at the local level.

- Increases in the number of jobs that may develop on the disposal and resource recovery side as the nation moves to environmentally acceptable disposal practices or on the general management side as public and private systems work to increase efficiencies will not equal the anticipated loss of jobs on the collection side, nor will "gained" skill requirements be necessarily similar (either in terms of skill or geographical location) to those lost.

- The supply of adequately trained manpower to perform State level functions appears to be consistent with current demand for such manpower. Increases in demand at this level are occurring, but at a fairly slow pace -- and the growth in overall supply is keeping pace with this rate of growth. It is also clear, however, that significant improvements in the scope and mission of State solid waste programs could create a situation in which demand substantially exceeds supply. Such changes are not likely to occur in the near term, however, without a strong stimulus such as new regulatory requirements, strong citizen pressures, etc. If and when these changes occur, the demand for skills related to these functions should be re-examined.

Other Findings, Issues or Problems

- When viewed as a total system, solid waste management is an extremely labor-intensive field, even though relative labor-intensities vary from element to element (e.g., between disposal and collection). There is nothing on the horizon to indicate either the prospect or the desirability of any major change in the labor-intense nature of solid waste management in the foreseeable future.

- Breakdowns in the labor components of operating solid waste systems occasioned by labor-management disputes can lead to an immediate breakdown of the total system. As demonstrated in New York City's "garbage" strike in 1968, such breakdowns can have severe implications for public health and safety. Case study analyses of such events, however, indicate that such breakdowns can be avoided through sound management practices if problems can be isolated to some degree from local politics.

- Manpower utilization and the costs of manpower are the major determinants of total costs associated with the operation of solid waste systems. Increased costs required for upgrading the nation's solid waste practices to environmentally acceptable levels can be largely offset through savings achieved through improved manpower practices. Such savings can, in fact, be quite substantial. Implementation of such practices, however, has more to do with the nature of the institutions responsible for handling solid wastes (e.g., their objectives, management skills, financing methods, hiring practices, union situation, incentives, etc.) than with the supply/demand or training aspects of solid waste manpower.

- Many solid waste systems operate with manpower pools significantly larger than necessary to handle the job for the intended or unintended purpose of providing employment to a sector of our economy facing restricted opportunities elsewhere as a result of increasing mechanization. Although solid waste management is one of the few remaining large-scale areas for employing unskilled labor, financial pressures on local systems are forcing local governments to effect cost savings in their solid waste systems that can be achieved by lowering manpower requirements. Consequently, the issue of efficiency versus job support looms large over the next several years.

- The manpower study and other evidence gathered by the Environmental Protection Agency have indicated that a comprehensive manpower development program is not necessary to provide trained manpower for this field at current demand levels. Should the demand change, this may not continue to be true. However, in the absence of such a change in demand, EPA recommends that no comprehensive manpower development program be undertaken.

- EPA recommends that direct special assistance programs for university training in solid waste be phased out in favor of general educational assistance that is available to all graduate students.

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III

STATE LEVEL MANPOWER: PROFILE AND ANALYSIS

III-A. PROFILE

At the current time, 1,044 State employees are projected to spend at least 50 percent or more of their time on solid waste responsibilities. Only 350 of these, however, are judged to have full-time solid waste assignments, and 77 of the 350 are employed by one State, Pennsylvania.

As indicated in Figure III-1 in Appendix B, the majority (58 percent) of State solid waste personnel perform managerial types of functions. Of this total, most (40 percent) are general management, a third are scientific/technical, and a fifth are regulatory. In general, State managerial personnel are required to have a college degree. Over a third of the agencies reporting managerial personnel require State certification or licensing for its general management, regulatory, scientific/technical, and "other" employees. About one in five require examinations for managers.

The mean weekly salary for managerial employees is $248. Within this group, the highest is for general management ($285), with substantially less for regulatory, scientific/technical and other management. The mean weekly salary for clerical/secretarial employees is on par with public (local government) and private sectors ($112 versus $114).

The types of State agencies employing these various categories of personnel are predominantly environmental agencies (35 percent of the States) and public health agencies (38 percent), with the remainder being public works, natural resources, and so forth. The types of State agency structures with solid waste management responsibilities are not predictable on the basis of State size or population. In some States, as many as four agencies have some solid waste management responsibilities or activities, while in others, no agency has solid waste functions. On the average, two agencies exist in each State that have significant solid waste management functions.

III-B. ANALYSIS

Compared to the 2,934 full-time State level employees in the water area and 4,256 in the air pollution field, very few persons are employed at the State level in the solid waste area (350 on a full-time basis, with 80 of those in one State alone - Pennsylvania). Each of these programs responds to different requirements so there is no reason for them to be of comparable size. However, it is interesting to note that State air and water programs are greater in numbers of full-time people by a substantial order of magnitude.

The determining factor of this situation appears not to be an inadequate supply of trained manpower to perform State level solid waste functions (even though there is a heavy requirement for skilled personnel), but lack of demand. Few solid waste management jobs exist at the State level, and those that do exist are filled with little difficulty, at least at the current level of demand.

Lack of demand for State level personnel -- i.e., the small number of available jobs -- is a function of the low priority that States have placed on solid waste management, the limited nature of most State solid waste legislation, and the level of funding that States have committed to the solid waste field. When compared to the air and water pollution fields, solid waste has ranked a distant third in the environmental field at the State level, not only in terms of attention that has been focused on solid waste management by State legislatures, but also in terms of the types of legislative authorities and funds that have been developed and implemented at the State level. Although there are notable exceptions, such as Pennsylvania and Alabama, most States do not have comprehensive solid waste legislation comparable to air and water pollution legislation. Until such legislation is achieved and funds are provided by the States to implement such legislation, the number of solid waste jobs at the State level is not expected to undergo any dramatic increases above its present level.

It should be noted, however, that States are increasingly concerned with solid waste management, largely due to (a) the impact other environmental actions are having on solid waste management, (b) the rising cost of solid waste management, (c) citizen pressures, and (d) Federal financial assistance provided under Section 207 of the Solid Waste Disposal Act, as amended. The level of solid waste legislative activity has increased dramatically in the last several years. In 1966, prior to the initiation of the Environmental Protection Agency's State Solid Waste Planning Program, only 13 full-time professionals were working in State programs, no States had solid waste plans, and no States had legislation capable of protecting, if enforced, environmental values from improper solid waste management. By 1972, this picture had changed significantly: 18 States had completed plans and 32 more had plans in various stages of development. Employment had increased to 350 full-time persons, and 32 States had enacted some form of solid waste legislation. At least 5 States were beginning to actively enforce statutes designed to ensure environmentally sound solid waste management.

Although this trend is likely to continue into the near future, the extent and pace of these developments is impossible to predict. Consequently, it is not possible to ascertain at the present time whether or not the current rate of supply of personnel to perform State level functions will keep abreast of growing demand. The problem of estimating is further

complicated by the fact that manpower needs for quality programs vary significantly from State to State, depending upon how each State defines its mission and role and divides responsibility between itself and its constituent local jurisdictions. Alabama and Pennsylvania currently have what are considered to be effective, adequate State level programs. Alabama has only three (3) persons involved in carrying out its State legal solid waste program while Pennsylvania has more than seventy (70). This clearly indicates that program effectiveness in not necessarily a function of size of staff.

In spite of these difficulties, it is likely that current supply will keep pace with the slow growth of demand for personnel to perform State level jobs in the solid waste area and that sharp increases in demand occasioned by some major event (e.g., a State standards thrust would probably produce a temporary short-fall in available manpower). If and when such a thrust occurs, EPA will assist in the description of skills needed, and the development of needed manpower, if it is not otherwise forthcoming.

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IV

LOCAL OPERATING MANPOWER: PROFILE AND ANALYSIS

IV-A. PROFILE

IV-A-1: Size and Composition

As indicated in Figure IV-1 in Appendix B, the solid waste management field at the local operating level (excluding resource recovery) consists of 226,700 people: 124,900 of whom are employed by 10,678 private contractors, and 101,800 of whom work for 2,982 municipal and county agencies.

Approximately 170,300 or 75 percent of these people are directly involved in the collection/transport function, with the remainder involved in transfer, processing, disposal, clerical, administrative, technical, and other functions. Ninety-five percent of all agencies and companies in solid waste management perform collection functions although some of these are also involved in disposal.

The bulk of the people (81.4 percent) work in skilled and unskilled categories, indicating that solid waste management requires large numbers of "direct" employees (those directly involved in the collection and disposal of wastes as opposed to working in supporting activities). This is even more pronounced in the public sector (88.9 percent) than in the private sector (75.2 percent). Only 8.7 percent of the local operating workforce is involved in managerial, professional or technical jobs.

IV-A-2: Salary and Other Benefits

Nationally, unskilled laborers make the lowest base salary ($111) and those in the professional-technical-managerial categories make the highest ($203). Salary ranges by skill level are indicated in Figure IV-2 in Appendix B.

Comparing the solid waste industry salary figures with national averages for each job category shows the solid waste field pays approximately the national average in all categories except secretarial where it pays much higher. These comparisons are provided in Figure IV-2 in Appendix B.

Salaries vary across the country as a function of several factors. First, size of company or agency appears to play a large part in determining salary in this field. Within public agencies, mean salary is higher as a function of an increase in the size of the organization for managerial

personnel, and higher for skilled employees in organizations with over 50 employees. Among private contractors, salary level is directly related to company size in three job categories: managerial, clerical, and unskilled.

The Standard Metropolitan Statistical Area size is a major factor affecting salary. The effects of both this factor and company (agency) size are shown in Figure IV-4 in Appendix B. In almost all cases, salary is a direct function of SMSA size. The span of salaries is particularly wide in the private managerial category across company size, ranging from $168 in the smallest companies to $296 in the largest. In general, the range is greater in the private sector, which is to be expected. The entire effect of SMSA size is not surprising since the wages, to some extent, reflect the higher cost of living in large cities.

One final variable affecting salary is region of the country, as shown in Figure IV-5 in Appendix B. The highest paid regions are the Northeast, East Central, and far West. This, too, is not surprising since these encompass the large population centers with relatively high living costs.

Employee benefits, on the whole, are offered more among public agencies than among private contractors. Among those organizations which offer employee benefits, almost all have no exceptions to the benefit package and cover all job categories equally.

Most organizations that include profit sharing and sick leave as employee benefits pay all of the contribution for those benefits. Private contractors who offer medical-surgical insurance, group life insurance, or a retirement plan are more likely than public agencies to pay for all of the contribution for these benefits. Generally, among private contractors, the larger the company the higher the percent of companies (of that size) offering each employee benefits.

IV-A-3: Public-Private Differences

The private sector has a higher proportion of employees in the management category than the public sector (See Figure IV-1, Appendix B). There are several explanations for this. In the private sector there are many small "owner-operator" firms in which the owner classifies himself as management, even though he often also serves as driver and helper. (There are 2,600 one truck operators in the U.S.)[1] In the public sector, the low number of management personnel is partially due to the limited number of people that spend at least 50 percent of their time in solid waste activities. It is very common, for example, for a city or borough manager or public works director to spend less than 50 percent of his time

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[1] "The Private Sector in Solid Waste Management - A Profile of its Resources and Contribution to Collection and Disposal" for the National Solid Wastes Management Association, June 1, 1972.

in solid waste management. Consequently, in such situations, there may be literally no people in the management category. This is not the case in private operations.

The private sector also utilizes a higher skilled to unskilled worker ratio (2:1) than the public sector (3:5). This is primarily a result of the larger average crew size in the public sector (2.5) compared to the private sector (1.6).[1] Since drivers are classified as skilled workers and helpers as unskilled, the larger the crew size the more unskilled people employed. These differences are partially due to the greater tendency of the public sector to be more "job support" oriented than the private sector (See Chapter VIII), but, also and perhaps more importantly, to the different types of wastes handled by the two sectors. The private sector manages virtually all of the nation's commercial and industrial wastes (94 percent and 91 percent, respectively), whereas the public sector's responsibilities center mainly in residential wastes (even though it manages only 50 percent of the wastes in this category). Commercial and industrial waste collection normally requires only one man - a truck driver using a front end loader to empty bulk cans. Residential collection, on the other hand, is sometimes handled with one and two man operations, but three to five men crews are the rule.

Finally, private sector employees have a higher mean gross weekly salary than their public sector counterparts (See Figure IV-3, Appendix B) in every job category except clerical/secretarial. This disparity is due not only to unequal pay and a higher skilled-unskilled ratio in the private sector, but also to the fact that employees in the private sector work a longer "week." (See Figure IV-6, Appendix B.)

IV-B. ANALYSIS

IV-B-1: Barriers to Entry

In examining the barriers to entry into the solid waste field, the factors examined were method of obtaining the job, education, experience, race, and age.

Method of Obtaining the Job

One barrier to entry, if it can be called such, is not knowing someone in the field. Six out of ten employees at all levels secured their present job through personal acquaintance, while two out of ten just walked in and applied for their job, and the remainder obtained their job through other means. Under these circumstances, any bias there was in the

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[1] Ibid.

initial hiring would perpetuate itself since employees would be likely to recommend the job to friends and peers. This practice is most prevalent in the private sector where significantly more employees at all levels gained their job through personal acquaintance.

In many parts of the solid waste field, recruiting does not take place as a formal process because of this practice. However, for those few who are recruited, Figure IV-7 in Appendix B shows the mean number of employees being actively recruited in the public and private sectors by job category. This table represents an "instantaneous" look at the manpower demand at a particular point in time. More recruiting is done in the private than in the public sector.

Education

Education can be described as no barrier to entry into the field, since requirements are almost nonexistent for 82 percent of the work force (at the skilled and unskilled job levels). Managerial employees are required to have more than a high school diploma in only about one quarter of the companies and agencies sampled. The exceptions are the small number of scientific and technical personnel who are required, in four out of five cases, to have a college degree or higher. At the State and Federal levels where scientific and technical jobs exist, education becomes more of a factor in entry. However, this group represents a very small number of jobs in the field.

Public agencies are more stringent in their educational requirements for management employees, and private contractors' requirements tend to increase with the size of the company. This supports the thesis that large, private companies begin to resemble stronger institutional organizations such as public agencies. The size of the organization, with the concomitant need for better educated people, results in more emphasis being placed on education.

Experience

At the unskilled level, experience is not generally required, so lack of experience cannot be construed as a barrier to entry at this level. However, at the skilled level (which includes drivers) experience begins to be important, and it is definitely a factor at the supervisory level. Lack of experience, therefore, is only a "barrier to entry" at higher levels, and not at the lowest levels.

Race

Race does not appear to be a barrier to entrance into the solid waste management field, at least when viewed nationally. This open situation is probably a function of the fact that non-whites can enter the system at the unskilled level. It is clear, however, that hiring practices frequently follow ethnic lines in specific local situations, particularly in the private sector. Therefore, since entry is often related to having close friends or relatives in the business, existing ethnic patterns tend to perpetuate themselves.

Age

Age does not present a barrier to entry in the classical sense. However, there are age differences which reflect different hiring patterns in the public and private sectors. The private sector has the modal group of its unskilled people in the 20-24 age bracket, and 85 percent of its unskilled people are 44 or under. The public sector modal group is 25-29, and only 70 percent of its unskilled people are 44 or under. The same type of relationships hold for other job categories. This supports the thesis that the private sector tends to be younger than the public sector. The only sense in which this could be construed as a barrier would be that the private sector prefers younger people, and indirectly discriminates against older people.

IV-B-2: Barriers to Advancement

Advancement (in the form of promotion) is slow within the field of solid waste management with less than 10 percent of the unskilled workers and half of the skilled workers having ever received a promotion. Even among employees who have been with their organization over 10 years, only 18 percent of the unskilled and 68 percent of skilled workers had received a promotion. One reason for so few promotions among unskilled workers may be the virtual lack of stratification in the category of jobs done by unskilled workers. Thus, for an unskilled worker to receive a promotion would move the employee into a skilled worker position. This same pattern may also hold true for skilled workers, half of whom have received a promotion, while 80 percent of the supervisors have been promoted.

Among unskilled workers, only 12.3 percent of the whites, and 3.8 percent of the blacks had ever received a promotion. Also, 13.5 percent of union members and 5.7 percent of non-union members had received promotions. This would seem to indicate that race and lack of union membership constitute barriers to advancement from the unskilled level to the skilled level.

Among skilled workers, blacks received more promotions than whites (71.6 percent and 45.1 percent, respectively) and public employees have more promotions than private employees.

The basis for promotion as listed by solid waste industry management is predominantly split between a merit basis and "None" (as an "Other" category). Among public agencies, only a small fraction cite Civil Service as a basis for promotion. About two-thirds of these public agencies have no basis for promoting managerial personnel. As the job category moves down-scale, a higher and higher proportion of agencies utilize a merit system, specifically based on an employee's work, ability, and performance as a basis for promotion. No clear pattern of the basis for promotions at any job level developed among private contractors. Work, ability, and performance are most frequently cited as the basis for promotions if a merit system exists. In most other cases, however, there is no formal basis for promotion.

The incidence of raises is much higher than promotions in the solid waste industry. The great majority of employees at all three job levels have received one or more raises since joining the organization.

Both skilled and unskilled workers received more raises if working for a public agency than a private one, and also received more raises if a member of a union. The increased chance of these employees receiving raises probably reflects the automatic raises associated with Civil Service systems or union contracts, which an employee receives after he has been on the job a given length of time.

The number of raises per year was less than one a year for all three job levels, with skilled workers receiving raises the most often (one every 15 months).

IV-B-3: Career Ladder

In most job situations, it is desirable for management to develop a sequence of job levels which form a natural progression for the more competent performers. This is sometimes referred to as a "carrer ladder" in that it represents a well-defined path for an employee to follow or on which he can set his sights. Numerous studies of employee behaviour over the last twenty years have shown that their perception of a career ladder improves the performance of unskilled workers since they do not feel that they are in a "dead end" job. This type of impact is even more pronounced in the categories of skilled workers and supervisors.

The career ladder concept is not a significant managerial tool in solid waste management, primarily because of the difficulties in devising an effective ladder within the industry. The mechanics of solid waste management are such that the industry requires "thousands of unskilled workers at the bottom, and only a few skilled workers at the top" (See Figure IV-1, Appendix B) to effectively accomplish its objectives. In such a situation, progress from unskilled to skilled to supervisory to managerial positions is hampered not only by the radically small number of jobs that exist at the next higher level and the larger number of people competing for those jobs, but also by the fact that lower level jobs do not necessarily equip persons to handle higher level jobs when such jobs open.

Consequently, little effort has been made to devise effective career ladders in the solid waste industry. In the private sector, for example, many companies operate on the premise that people in "helper" positions will not remain on the job very long -- i.e., that they will seek other jobs after a set period of time. The few that do remain are moved into higher level jobs. The public sector operates in a similar fashion.

One public system that has achieved some significant success in this area is Inglewood, California. Like other systems, Inglewood assumes that its unskilled workers will not remain on the job forever. Unlike other systems, however, Inglewood operates on the premise that its workers (at the unskilled and skilled levels) should not remain on the job for more than three years and actively assists its employees in moving out of the system into higher level jobs elsewhere. This commitment is accomplished by the systems willingness to provide training in various skills for its employees through local community colleges, night schools, and so forth to assure that the employees eventually obtain "better" jobs (e.g., policeman, fireman, accounting, etc.).

Apart from systems like Inglewood, however, little is done in the career ladder area in solid waste management. In its place, most systems utilize other motivating factors, primarily pay raises and improvements in benefits. This type of substitution is borne out by EPA's findings that "chances of promotion" as an index of career ladder is not highly correlated with any variables except chances of a raise (i.e., workers perceive promotions not as increases in level of responsibility, but as increases in salaries or benefits).

This also explains, to some degree, EPA's findings that unions appear to dull somewhat the issue of a career ladder -- or lack thereof -- in the solid waste industry. Unions offer a mechanism for negotiating wages and benefits, those factors which employees equate with upgrading and promotion. Therefore the union employee does not need to perceive a career ladder to receive rewards and satisfaction -- the union does it for him.

IV-B-4: Turnover and Absenteeism

Turnover

Turnover is the rate at which people leave a job, resulting in a requirement for someone to fill the job. Mean numbers of people terminating in the past year in the solid waste industry are shown in Figure IV-8 in Appendix B. The same figures are converted to "annual turnover rates" in Figure IV-9 in Appendix B since such rates are more commonly used in other industries and can be used for comparative purposes.

As indicated in these Figures, the local operating segment of the solid waste management industry is a field which experiences 55,300 terminations a year but manages to fill these openings in a short period of time with no real recruiting problem. On any typical day, only 4,137 positions, or 2 percent of the work force, is being recruited. The annual turnover rate for the industry across all job categories is 27.1 percent in the private sector and 20.1 percent in the public sector. Although these may seem high, comparative data for other industries which utilize similar proportions of unskilled workers indicates that solid waste management turnover rates are generally below those of other fields, particularly manufacturing.

The turnover rate observed among unskilled laborers is primarily voluntary (i.e., there are few people being "fired"). This suggests that the hard physical work conditions at the lower levels are too much for many people, especially when coupled with lack of any substantial career ladder in the field. This situation also reflects the fact that many unskilled workers are not satisfied with their jobs in this industry (See Section IV-B-7).

Turnover for management, supervisory, and clerical categories is low for both public and private functions. Turnover for skilled and unskilled are high in this industry with skilled at 17 percent per year and unskilled at 41 percent per year. Within these figures, the private sector has significantly higher turnover than the public sector in skilled (21 percent vs. 9 percent) and in unskilled categories (59 percent vs. 30 percent). However, the comparison of these figures with annual turnover in the manufacturing industry of 48 percent for durable goods and 58 percent for non-durable goods in October 1971[1] shows that these rates are not inordinately high.

The contrast between public and private systems shows higher private turnover at all job levels except management and supervisory; and great disparities at the skilled and unskilled levels. This phenomenon results from the fact that unskilled private annual turnover is extremely high (71 percent - 74 percent) among smaller and middle-sized companies (1-49 employees), but drops down to 33 percent at companies with 50 or employees. This suggests an institutional effect of "bigness" which would also be a characteristic of public institutions. Such institutions provide both large numbers of people and a more formal hiring and personnel management function which lend themselves to a more stable work force.

In some cities, institutional changes have had positive effects on turnover. In Fort Worth, Texas, conversion from backdoor service, which is more physically demanding, to curbside service early in 1970 led to a decrease in the annual turnover rate from 165 percent to 90 percent in one year. Recent statistics indicate it will be reduced even further in 1972. The reason given by the unskilled workers for this improvement is that the work is not as hard or as "demeaning" as it was before the change. In other cities, like Inglewood, California, the opportunity for a "better" job after several years in sanitation lowers the random turnover because ir includes "planned" turnover for career betterment.

Absenteeism

Absenteeism is important not only because of lost man-days, but also because it may reflect the worker's attitude toward his job and management's personnel policies. At the unskilled level of the solid waste field, the absenteeism rate is 6.2 days per man per year compared to the national average of 6.6 days per man year. In general, therefore, absenteeism is not a significant problem.

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[1] "Statistical Abstract of the United States," 1971, Department of Commerce.

There is wide variability in absenteeism among cities and this variance can be traced to diverse management policies. Extremely high absenteeism was found to exist in Atlanta; 20 percent of the work force on a normal day and as high as 40 percent on some Mondays (Monday is both the most difficult day of the week and the first day after the weekend). This level of absenteeism results from a system which permits such behavior; management penalizes people who are absent by only docking their pay. The management philosophy in Atlanta favors "job support" rather than efficiency so there are definite tendencies to be lenient with absenteeism and give unlimited chances to people who are absent frequently.

In contrast, Fort Wayne, Indiana, a highly managed system that does not tolerate inordinate absenteeism on the part of its employees, experiences absentee rates of only five to ten percent on any given day. Fort Wayne, however, is extremely efficiency oriented (i.e., no job support objectives), primarily due to the fact that its method of financing its system -- a user charge -- requires that the system do no worse than break even each year.

As indicated in Figure IV-10 in Appendix B, public sector employees in the unskilled, skilled and supervisory categories have a higher absenteeism rate than their counterparts in the private sector. This variation appears to reflect the greater job security (and hence, less control of absenteeism) offerred by the public sector.

IV-B-5: Race

There are definite differences between whites and non-whites in the solid waste field and, in turn, differences in their attitudes toward their jobs. Discrimination shows up as a possible cause of some of the disparities, although identifying discriminatory practices in definite terms is difficult.

The percentage of non-whites in the work force is lower at the high levels than at the lower levels. At the skilled and unskilled levels, 50 percent of the work force is non-white; at the supervisory level (public and private), the proportion of non-whites drops to about 10 percent; and at the managerial level, it drops to less than 5 percent. This finding was also borne out in some of the case sutdies in which non-whites comprised 80-90 percent of the unskilled work force, ten to fifteen percent of the supervisors and only a negligible portion of the management staff.

This situation compares to the national average of 7 percent non-white in white collar jobs, and 15 percent non-white in blue collar jobs. Therefore, while three times as many non-whites enter this field, only about the same proportion as the national average attain white collar jobs. Moreover, the average skilled or supervisory non-white employee sampled has been at his job longer and earns less than the average white employee at the same level.

Other findings indicate that non-white unskilled employees are less likely to get any on-the-job training than are white unskilled employees and that the training is more likely to be administered by a co-worker as opposed to a supervisor. Off-the-job training, usually reserved for the supervisory employee, is less prevalent among non-white supervisors than among white supervisors. Instead, they are more likely to receive on-the-job training but for a shorter duration than white supervisors.

With respect to benefits, skilled and supervisory white employees sampled are more likely to receive sick leave and retirement plans. Furthermore, among employees who receive either medical or retirement benefits or group life insurance, whites are more likely than non-whites to have the entire package paid for by their employer. This is only partially due to the fact that non-whites are less likely to have the higher level jobs which carry these benefits.

Although these findings point to discrimination against non-whites in the solid waste industry, certain factors should be noted. First, the unskilled non-white workers have the lowest education of any employee segment in the field and second, the skilled and unskilled non-white workers are more likely to be absent than are white workers at comparable levels. With this in mind, certain of the findings which point to discrimination may be softened. There is also the possibility of indirect discrimination by virtue of the usual means for obtaining employement in solid waste. That is, since personal acquaintance is the most likely method of securing a solid waste job, it is logical that non-white applicants would be recommended in a predominantly non-white system. They would probably apply for the same job as their friend and would most likely possess a similar set of skills, the result being the same job.

IV-B-6: Union/Non-Union Membership

As indicated in Figure IV-11 in Appendix B, union membership varies according to job category and between public and private sector operations. Public employees are union members to a significantly greater degree than private employees at all levels.

Union members receive more rewards than non-union members over all job levels. Union members earn a higher gross weekly salary, and receive a greater number of promotions and raises since taking their jobs. With respect to benefits, union members are more likely to receive a greater number of benefits, and among employees who receive either medical or retirement benefits or group life insurance, union members are more likely to have the entire package paid for by their employer than are non-union employees. All of these facts support the fact that union membership tends to benefit the employee.

In spite of these benefits to the individual employee, the effect of unions on the total system appears to be less than desirable. First, systems with union affiliation tended to experience lower productivity, and hence higher costs than non-union systems. For example, the comparative productivity for the following union systems compared to national public and private means are:

	Milwaukee	Minneapolis	Tacoma	National Public Mean	National Private Mean
Tons/Man/Day	1.6	2.0	1.9	3.0	6.1
Tons/Truck/Day	6.5	6.1	5.7	7.6	9.1

In all three of these cities the entry level relative wages are high for the areas.

In addition to productivity, other attributes which are associated with institutional inefficiency are present in union systems. For example, absenteeism is much higher nationally at all employee levels in union systems than it is in non-union systems as shown below:

	Mean Days Absent Annually	
	Union	Non-Union
Unskilled	9.12	4.34
Skilled	5.82	4.30
Supervisory	8.16	1.54

These statistics indicate some of the problems of unionization which the system must face.

In summary, union affiliation, which is prevalent in the public sector, tends to reinforce institutional features, both positive and negative. Some of these features are stability, benefits, job security, absenteeism, inefficiency, etc. The lack of union promotes features such as employee competition, instability, emphasis on pay, efficiency, etc.

IV-B-7: Employee Attitudes Towards Advancement Opportunities and Their Jobs

Advancement Opportunities

The foregoing discussion has analyzed the advancement opportunities in the solid waste industry, assessing various barriers to advancement and the degree to which those barriers are both significant and surmountable. It is equally important in this regard to examine the employee's view of the advancement potential in his industry and the criteria he perceives for successful movement up the career ladder.

The study conducted as a part of groundwork for this report found that employees at all job levels perceive "doing good work" as the most important factor in getting promoted at their jobs, with "experience" being the second most important factor.

Although "doing good work" is perceived as most important among all employee segments when the workforce is viewed as a whole, both public and non-white employees view it with substantially less prominence than private and white employees, respectively. Instead, employees of public agencies feel "passing exams" and "getting enough education" are more important than do private employees, and frequently cite "having pull" as playing a significant role in determining advancement opportunities. Non-white employees perceive "experience" and "seniority" as more important than other factors such as formal education or passing exams.

Satisfaction with Job

Overall satisfaction with one's job is difficult to measure, particularly on a national scale. Measures used in this study were (1) whether or not employees would recommend a career in solid waste to someone starting out, (2) whether they would choose the same career again, and (3) the length of their intended tenure in their present jobs.

First, employees are likely to recommend a career in solid waste. As the job level increases, so does the likelihood that they would recommend it as a career. Results are practically the same when the employees answered whether or not they would choose a career in solid waste if they were starting over again. The only exception to this is among public managers. They are less likely to choose the same career, or recommend the career, than are the public supervisors.

The likelihood that an employee will stay at his job is high regardless of job level. Nine out of ten supervisors and seven out of ten skilled and unskilled employees plan to stay until retirement. Public and union employees are more likely to stay until retirement than private and non-union, and as tenure increases, so does an employee's intention to stay. However, the results across all segments indicate that regardless of some relative dissatisfaction with particular aspects of their jobs (which can certainly be improved upon), the overall satisfaction is fairly good.

Sources of dissatisfaction, even though they do not add up to a degree of dissatisfaction that would alter the findings immediately above, center around pay, promotion possibilities, the nature of the work, variety in the jobs, and the work load. The magnitude of these sources of dissatisfaction, however, vary among job levels, public and private systems, and union/non-union situations. Patterns that emerge here -- e.g., public employees are less satisfied than private employees with their pay and promotion rates -- can be explained. They do not differ from comparable patterns in other fields.

IV-B-8: Safety

Although no accurate or reliable information exists on a nationwide basis concerning the incidence of injuries and the costs of those injuries in the solid waste field, there is abundant evidence that both the frequency, severity and costs of injuries in the field are high.

A study recently completed for the Environmental Protection Agency of thirty organizations (primarily to assess both the validity of past record keeping and problems with maintaining adequate records, and to design a sound record keeping system), for example, found that direct and indirect costs of injuries may amount to as much as 20-25 percent of labor costs, which account for approximately 80 percent of all solid waste costs in this labor-intensive industry.

Along these same lines, one of the study's most striking findings was that management is usually insulated from knowledge of the actual magnitude of the injury problem in their systems. Consequently they (1) perceive their injury frequency and cost situation to be much lower than is actually the case when examined in detail; and (2) view their organization as "about average," even though frequency rates among the systems varied by a factor of five. It was also found, however, that when the true costs of injuries was made apparent to management, action followed to eliminate hazards. Thus, one of the most important steps to improving safety may be to simply make management aware of the true magnitude of the problem.

There is also evidence that costs associated with injuries are increasing at a rapid pace in most regions of the country. The California State Compensation Insurance Fund, for example, increased its rates from $7.44/$100 of payroll in 1970 to $9.27/$100 in 1972, an increase of 25 percent in two years. Similar increases are occurring in other States.

Findings of the aforementioned OSWMP study concerning the types of injuries and the cause of those injuries (i.e., the type of activity being conducted at the time of injury) are presented in Figures IV-12 and IV-13 in Appendix B. As indicated in Figure IV-12, sprains, strains, bruises, cuts or lacerations, and objects in eyes are the predominant types of injuries in the field (expressed as a percent of total injuries). More serious injuries such as fractures, or spinal disc problems are substantially less frequent, but lead to greater days lost than less serious injuries.

Work tasks involving movement of containers (lifting, dumping, etc.) generate the highest number of accidents in the industry, followed by such items as falling off trucks and getting in the way of equipment processes.

It should be noted that length of time on the job bears an inverse relationship to the chances of being injured on the job. As shown in Figure IV-14 in Appendix B, persons with more than two years on the job are more likely to be involved in injury producing accidents than those with less than two years work experience. This probably reflects the greater caution utilized by newer workers as compared to "old timers."

The injury problem also produces complications in labor-management relations. Alleged unsafe conditions were explicit issues in strikes of sanitation workers in New York City; in Washington, D. C.; in Des Moines, Iowa; and in a number of other cities. The high turnover of employees in some cities is partly due to fear of injuries. In some cities there are frequent disputes over the application of rules that govern whether or not full pay will be continued when an employee is away from work following an injury.

IV-B-9: Supply and Demand

The supply of manpower to perform solid waste management jobs at the local operating level appears to be relatively consistent with the demand for such manpower when viewed from a national perspective. This is evidenced by the low level of recruiting being done on any given day and the ease with which positions are filled, and probably results from the fact that many of the jobs in the industry require unskilled laborers.

This is not to say that specific situations exist in which supply of manpower does not keep pace with demand. There are systems, for example, that have a difficult time finding sufficient manpower to handle their collection responsibilities. This situation, however, appears to have less to do with the availability of manpower with the necessary skills to handle solid waste tasks, than with such factors as comparative wage structures, working conditions prevalent in the system, the general economic situation of the area in which the system exists, and so forth. These situations are largely offset nationally, however, by systems which have long waiting lists of people seeking employment.

Openings in the management category are filled with greater difficulty than openings in other categories, indicating a possible shortage of adequately trained personnel to perform management functions. This finding is underscored by the numerous expressions of system managers concerning the difficulty of finding qualified management level personnel to work in the solid waste area, not only in public systems but in private systems as well.

Virtually all systems improvements in the direction of efficiency result in a net decrease in manpower requirements. This is particularly true in the collection function which is very labor-intensive. For example, efficiency is often achieved by reductions in crew size and in the total number of crews.

These factors all point to a substantial reduction in manpower requirements over the next five years in the solid waste field. These reductions, however, will be offset to some degree by an estimated increase in the demand for unskilled and skilled employees on the disposal function of solid waste management. Demand has historically been low in this area, primarily due to the types of disposal operations conducted in this country (e.g., open dumps). As States move to require environmentally acceptable disposal practices, there will be an increase in demand for people to operate disposal sites in accordance with these improved practices, particularly heavy equipment operators for sanitary landfills and technicians for incinerators. Increases in demand in this sector, however, are contingent upon standards and enforcement activities which force change, and it is impossible to predict how fast this will occur. It is clear that potential increases in manpower demand in this area will not be as large as reductions in manpower demand in the collection function. In any event, lost jobs in the latter category will not equate with gained jobs in the former (by skill or location), so a net manpower requirement will exist in disposal in the face of a surplus of manpower in collection.

Finally, it should be noted that as the requirement for unskilled workers diminishes in an industry, there is a corresponding rise in demand for more highly skilled people to operate new systems and equipment. This is true in solid waste management, but not in great numbers. In many cases, it is merely the more skilled segment of the existing work force which remains after cutbacks, thereby not really creating new jobs. Consequently, no great surge in demand for manpower will accompany mechanization and technological change in this industry.

V

RESOURCE RECOVERY MANPOWER: PROFILE AND ANALYSIS

V-A. PROFILE

The latest census data available on the secondary materials industry (1967) indicates a total employment level in the industry of 79,000 persons. This figure includes collectors, brokers and dealers, and processors of scrap materials, but excludes users (converters or manufacturers), scavengers or the "local junk" collector, and persons employed by social welfare organizations such as the Goodwill Industries and Salvation Army who participate in collecting and processing secondary materials. Inclusion of the scavengers and social welfare organization employees would bring the total number of persons employed in the resource recovery/secondary materials field to approximately 100,000.

There are four basic categories of employees required in the resource recovery field: (1) unskilled labor for materials handling operations (collection and transport); (2) skilled equipment and machine operators for materials handling and processing (cutting, baling, shredding, crane operation, etc.); (3) sorting personnel who obtain their skills through experience, not formal education; and (4) managers. The largest category of workers are the unskilled and sorting personnel. Utilization of specifically trained technical personnel is minimal in this sector, primarily due to lack of demand for such skills.

Increased emphasis on resource recovery is attracting a growing number of engineers and technologists into the resource recovery field to design and develop increasingly sophisticated hardware systems. Although no estimates are available on this segment, the number of people involved appears to be very small.

V-B. ANALYSIS

Resource recovery, performed by the secondary materials industry, is not, strictly speaking, part of the solid waste management system of the nation although the activities of this industry have a significant beneficial impact on solid waste management by removing from consideration an estimated 50 million tons of potential waste materials yearly. Resource recovery, much like solid waste management, is labor-intensive, largely because the collection of the secondary materials is a labor consuming activity. The actual processing of materials collected, while still heavily reliant on manual labor, is becoming increasingly mechanized as this industry, under the pressure of rising labor and other costs, is now turning to technology to improve its labor productivity.

Key trends in the industry with a likely impact on its labor profile are the following:

-- increasing mechanization is improving labor productivity and will be instrumental in reducing manpower requirements per ton of material processed.

-- consolidation is taking place in the industry (decrease in the number of establishments and increase in the dollar-size of the remaining establishments) in order to take advantage of mechanization, which requires large through-put tonnages; the labor consequence of this trend is a growing demand for more skilled labor and more sophisticated managers.

-- decline in some segments of the industry is taking place, particularly in the textile recovery area, where difficulties in marketing the output products, unavailability of mechanical processing/sorting systems, competition from virgin materials, and rising labor and transportation costs have made resource recovery economically marginal. The labor impact: disappearance of unskilled jobs.

-- integration of solid waste and resource recovery activities is on the horizon. Private waste removal contractors are increasingly active in the recovery of corrugated board from commercial and industrial wastes and in the recovery of mixed office wastes. The labor consequence of this trend is that solid waste management manpower will be used more extensively to perform secondary materials collection and processing chores, the consequence being more efficient utilization of manpower by both sectors.

These trends will create additional demand for manpower with technical operating and engineering skills and reduce the overall need for both unskilled labor and labor involved in sorting processes which require skills that are obtained through experience. Since the extent of this trend is impossible to determine at the current time, it is not possible to determine the overall impact of the trends on resource recovery manpower (mix and numbers) over the next five or ten years.

The manpower outlook then for the resource recovery/secondary materials industry over the next several years is one of some alterations in the base (an increasing number of skilled/technical personnel and fewer unskilled) and some reduction in the number of persons employed per ton of through-put in the industry.

No dramatic changes -- such as a rapid increase in the number of resource recovery jobs -- can be envisioned. Manpower increases would be likely only if demand for secondary materials changed. Although total, absolute demand for such materials is increasing, the rate of increase is substantially lower than the rate at which the demand for virgin, primary materials is growing. The need for additional resource recovery manpower, however, may occur if secondary materials begin to close this gap and penetrate markets now dominated by virgin materials. Such an event could result from changes in the relative economic/market situation for recovered materials when compared to virgin materials, a possibility only if government intervenes to create a demand for secondary materials by incentives such as tax credits or subsidies. Without such intervention, there are no technological or economic events on the horizon which would signal such a change; the demand for recovered materials will continue to increase at a fairly slow rate, and manpower needs will be able to keep pace with the small upward adjustments in demand.

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VI

LABOR-MANAGEMENT RELATIONS

Labor management relations are of primary interest in this field because it is so labor-intensive. In both the public and private sectors, labor makes up 60-85 percent of the collection costs for residential service. When the labor system breaks down, the entire system breaks down as evidenced by the strikes in New York, Memphis, Atlanta, and other cities. For this reason, two general aspects of labor management relations are important: the day-to-day dealings between labor and management, and the mechanisms available for handling catastrophic labor problems. Both of these are addressed in this chapter.

VI-A. THE SOLID WASTE SYSTEM AS A PART OF THE CITY SYSTEM

Public sector solid waste management systems are constrained by the political, economic, and social environment in which they are found. Similarly, the private sector, to the extent that it operates under government contract or franchise, is constrained by the same structure of the city system. Some examples of how the city system affects solid waste management are described to point up these constraints. In Minneapolis, a debt ceiling of the city government prohibited it from borrowing additional money to operate its own system, thus requiring it to franchise both collection and disposal to private contractors. In addition, the sanitation department wanted to eliminate the remainder of its fleet, but was inhibited from doing so by strong union influence to maintain the existing jobs. In Milwaukee, the inability of the city government to obtain land for disposal resulted in a contract to a private firm to handle the entire disposal function. In another city, the election of a new mayor and his handling of a municipal labor dispute contributed to a strike by solid waste employees.

Additional constraints imposed by the city system on the sanitation system are related to Civil Service and union conditions. Where there is a strong Civil Service system, people build up seniority and the sanitation director must accept them, whether or not they are qualified. Although such a system offers certain advantages to both labor and management, it often results in a sanitation department's having a work force in excess of what is needed to accomplish its objectives. The union condition is usually related to the city, such as in Tacoma, Milwaukee, and Minneapolis. In these cities, the union is strong and has achieved complete unionization of both the public and private sectors of this industry.

In summary, the solid waste system, whether it be public or private, must be able to operate effectively within the constraints and conditions of the city in which it resides.

VI-B. THE CONDITIONS LEADING UP TO STRIKES AND MECHANISMS FOR AVOIDANCE

Although strike or potential strike situations vary from system to system in terms of underlying or generating causes, such variation in the solid waste industry is slight, focusing not around different issues in many cases, but the extent to which similar issues or problems manifest themselves in a particular system. Consequently, in-depth information developed on labor-management relations in the case studies conducted as part of the information gathering effort for this report was instructive on the subject of labor-management relations for the average solid waste system.

In two of the communities studied, there has been a complete cessation of service within the last three years and a "near-strike" in a third. Tacoma had a very short strike involving solid waste and other city employees. Atlanta has had two recent labor-management disputes, with the last one being both long and bitter, and Fort Worth came close to a strike before an agreement was finally reached.

The long-term features or underlying problems of Atlanta and Fort Worth centered around extremely low absolute and relative wages, racial unrest and various management problems. Two outward signs of these problems which existed in both cities prior to the strikes, and remain in Atlanta after the strikes, are high turnover and absenteeism. The Tacoma situation involved the exercise of power on a number of fronts to change the whole structure of management, including the political leaders of the city.

The immediate causes for the collapse of the three labor-management systems relate to the experience and approach of the two segments as much as the underlying causes discussed above. A number of discrete problems can be identified:

- Management is unprepared to "meet and confer" or "bargain" with their employees:
  - -- they have no position to bargain from
  - -- they have no goal to bargain to
  - -- they have no expertise in the process of bargaining
  - -- their management role is unclear.

- There is no established machinery for dealing with impasse resolutions.

- There is low recognition that a number of procedures are available for use in avoiding severe labor-management disputes.

Management has open to it a number of alternatives for developing a better industrial relations system. Improvements in the system can avoid both long-run costs as well as those critical total collapses that have been observed in some of the cities in this study and elsewhere. Generally, management is unaware of the options available to it and the consequences of experiences developed throughout the country. At the immediate need of overall management is a communications system, preferably to the top decision makers in a community. This implies a need for management assistance for elected officials at the level of the mayor, county commissioners, and county councilmen, as well as appointed officials in those communities that have city managers or county managers.

This management assistance might take the form of an analysis of the solid waste system, the identification of problem areas, and the recommendation of solutions. Some of the problems might be in terms of inefficiencies of operation labor unrest, racial problems, imminent air or water pollution standard implementation, etc. This assistance could be provided directly to the city, or first at the Conference of Mayors or National League of Cities to alert these groups to the availability of the assistance followed by direct contact with the individual cities.

There is a reason to believe that grievance procedures or lack thereof, may also be the object of substantial controversy. While historical developments in the improvement of merit law have developed grievance procedures as a vehicle for resolving differences, frequently there has been a perversion of the procedure with awards becoming arbitrary, discriminatory, or nepotistic. Rather than being a device for resolving conflict, the grievance procedure may itself become an object of conflict. This is particularly significant where the final step in the procedure is really handled by somebody who has become more identified in management and also where the charges are generally being brought by a minority group against those who are majority. The development of a better grievance procedure generally stands within the framework of the interpretation of an existing set of rules. One of the most common methods for developing this procedure is the use of third-party neutrals. Both the development of a formal (and utilized) grievance procedure (or a better one if one currently exists) and utilization of third-party neutrals are possible management assistance functions which might serve to avoid catastrophic division between labor and management in the solid waste field.

Another useful tool would be the development of comparable statistics among various systems, and standards for the industry. For example, in a labor dispute, productivity standards for a particular set of operating constraints might provide the basis for negotiation and a settlement.

VI-C. INCENTIVE PROGRAMS

A wide array of incentives are utilized in the solid waste field to stimulate manpower productivity. The basic incentive used is the "task system," which simply means defining a work task, and permitting the people to go home when that task is completed. The task is a "route" and the work unit is a "crew." In scheduling routes, a fixed number of stops, which ranges from 200-600 per truck for residential routes, is assigned to the crew. When this fixed number is completed, the crew goes home. This is an attractive incentive because it permits either a second job or leisure time. This incentive works the best where the crew memebers all are interested in this incentive and will work together in pursuing it. The task system is used primarily in the private sector because the prevalence of unions in the public sector restricts its usage. The task system conflicts with the concept of "overtime" and "straight time" and, therefore, unions are reluctant to accept it in their contracts. This incentive will permit more efficient scheduling and a realistic assessment of route size compared to time required to perform the task. However, management must exercise care in restructuring routes or they will defeat the incentive.

Another incentive used is premium pay for difficult tasks. For example, in Fort Worth, where the system has been changing over to curb service, a premium of $.10 per stop per week is paid for stops which still require backdoor service. Unskilled workers interested in this incentive can request routes with some backdoor service and make an additional $15-20 per week on this incentive. The effect on the system of this incentive is additional cost to management which is partially overcome by premium charges for backdoor service.

Other incentives used in the industry include such diverse arrangements as hot breakfasts served by a landfill operator in Milwaukee, and cash bonuses for crews missing the least pick-ups and having the cleanest truck, used by firms in Washington, D. C. The "hot breakfast" gets people to work on time, and the "clean truck" incentive promotes esthetics in the field.

A number of systems have implemented a "piecework" system. A firm in St. Paul, Minnesota, for example, pays its crews according to the number of stops serviced, such that crews which service large routes are paid more. The effect of this method on the system is not only to improve efficiency in terms of stops per truck per day, but also to build the costs of the incentives into the firms charges in a way that passes the benefits of increased productivity directly up to the consumer.

Among these options, the task system is most widespread, at least in the private sector, and appears to have the most appeal.

VII

IMPACT OF VARIOUS TRENDS AND EVENTS ON SOLID WASTE MANPOWER

Historically, solid waste management systems have been regarded as one of the most stable organizations in any given area by virtue of the fact that little or no problems related to the collection and disposal functions had been encountered. Those people comprising the collection arm were either fairly well paid as in the case of Milwaukee or Minneapolis, or had little ability to raise objections to working conditions such as in Atlanta or Fort Worth. Similarly, disposal was performed by either dumping or incineration, two methods that had years of proven applicability with few effective detractors.

In recent years, however, there have been social changes which have given rise to strikes and other labor problems in collection systems. In a similar sense, the disposal function has been seriously impacted by firm environmental legislation and a growing public awareness of solid waste and its ultimate disposal. In the summer of 1968, the catastrophic garbage strike in New York City signaled the end of a peaceful era in at least the public sector of solid waste management. Subsequently, it was found that a temporary solution to avoid recurrence of similar events was to upgrade the pay schedule of the sanitation workers, an event not looked upon with enthusiasm by profit making business men and the financially strapped municipal governments. Comparable problems have been encountered by the disposal arms, primarily as a consequence of the stringent air pollution requirements placed on stationary sources because of the Federal Air Quality Act. Compliance with these laws requires the expenditure of millions of dollars per incinerator facility to install state-of-the-art gas cleaning systems. This is beyond the means of most municipalities that own and operate incinerators.

The principal problem facing the industry is the economic problem of providing guaranteed collection and disposal of solid waste at the least cost. Two major types of events have been identified which force change in the solid waste management system: general system cost pressure which results in the city seeking efficiencies; and enforcement of air pollution standards, resulting in incinerator shutdown or prohibitions against open burning.

VII-A. COST PRESSURE RESULTS IN CITY SEEKING EFFICIENCIES

The increase in cost pressure with subsequent modifications of a collection system is most graphically illustrated by the solid waste management system in Fort Worth, Texas. On October 31, 1969, a residential refuse collection proposal was submitted to the city government for

the improvement of both system efficiencies and of labor relations. Historically, the collection and disposal functions in the city had been a profit making business, but an across-the-board pay raise in Fiscal Year 1968-1969 put the system in a deficit position. Concurrent with this development, the manpower turnover rate in the division had reached 200 percent, a condition which was a clear warning of labor problems to the city. The proposal had two main points, the offering of curbside service at a rate cheaper than carry-out, and a bonus incentive to the collectors for the performance of the latter service. Since the initiation of the proposal, several other changes have occurred with the net results that residential collection is now almost entirely curbside, crew efficiencies have doubled with a reduction in number of crews, and, the turnover rate has dropped virtually to zero. The bonus incentive, coupled with the prospect of an "easier" workday, and a four day work week, was enough to get organized labor to accept the reduction in jobs which the switch to curb service implied.

The cost pressure is the prime impetus for the changes that have occurred in the Fort Worth sanitation system. The alternative to the new system would have been to simply increase collector wages to that point where the salaries were commensurate with the efforts of the crewmen, and thereby "buy time" with no real fundamental changes in the system. The city chose the least cost solution and as an added benefit, improved the labor morale to a point where the possibility of a sanitation strike is remote. The level of service has remained at twice per week which is probably a requirement in southern cities, but the type of service has dropped back from the tedious carry-out to bagged curbside. Citizens have accepted the new service, and all but a small percentage of the population carry their refuse to the curb because it is significantly cheaper than backdoor service.

VII-B. ENFORCEMENT OF AIR POLLUTION STANDARDS

The adoption of recent air quality standards has closed incinerators and restricted other disposal techniques in many metropolitan areas in the country. Two cases in point are the solid waste systems of Minneapolis, Minnesota, and Milwaukee, Wisconsin. In the first case, the State's pollution control agency required the city to provide adequate collection and disposal techniques in order to eliminate the common practice of back yard burning of a considerable fraction of the residential waste generated in the city. In the same stroke, the disposal arm in this city, which was two incinerators, was required to terminate operation because of its inability to comply with the air pollution standards. Hence in the case of Minneapolis, both the collection and disposal functions had to change radically. Milwaukee faced a similar problem in that new air quality standards would have required the expenditure of millions of dollars just to upgrade the incinerators. The city's problem was further complicated by its inability to purchase or lease suitable landfill sites due to local political pressure.

The Minneapolis government has historically had the sole sanitation responsibility of the collection and disposal of putrescible waste whereas the private sector collected the trash from those customers that chose to purchase the service rather than burn their trash. The State air pollution control district placed the entire burden of managing the solid waste system on the city which had only a limited amount of resources to respond. To reach an acceptable solution, the city management negotiated two contracts with the private sector, one for the cooperative collection of solid waste with Minneapolis Refuse Inc. (MRI), and the other for disposal by transfer methods with Phoenix Industries. The collection function is now performed by both the city and MRI. Both Minneapolis and MRI utilize the transfer stations which were built by converting the two "old" incinerators, and are operated by Phoenix Industries. Whereas the waste was previously collected separately as garbage and trash, the initiation of the arrangement required the combination of waste types for a common collection. From all appearances, manpower and truck efficiencies have changed since the initiation of the new service. As indicated in Figure VII-1, in the appendix, the private sector is performing the collection service at a lower rate than the city for reasons, primarily, of manpower efficiency. Citizens appear satisfied because they now get both types of waste collected. A private firm operating under a franchise appears to have offered the city significant overall advantages in the performance of its collection and disposal responsibilities.

The city of Milwaukee has always been responsible for the collection and disposal of the residential solid waste of the city. In recent years, an extensive effort by the city government to procure additional suitable disposal sites for the waste collected has been continually unsuccessful. Private contractors, on the other hand, appear to be able to procure land for such purpose where the city fails. The initiation of the new air pollution standards made continued incineration an extremely expensive proposition, so the city turned to the private sector for aid and Acme Disposal Service Inc., a division of Waste Management Inc., responded with the lowest responsive bid. This private contractor has taken over the transfer and disposal functions since January 4, 1971, and to date has provided good service at an acceptable cost.

As part of the response to air pollution standards, Milwaukee decided to consolidate garbage and trash collection since trash could no longer be burned in backyards. This consolidation resulted in a drastic reduction in routes and in the need for men. Since the end of 1970, the city has taken steps to turn back a considerable number of jobs but because of strong union influence and a fairly generous civil service system, it is meeting with a fair amount of resistance to this process. Disposal costs have dropped because of the shift from incineration to transfer with subsequent sanitary landfill. Total system costs, however, have been reduced only slightly due to the magnitude of the rise in collection costs. The benefit to the environment, however, is clear: private and municipal disposal by incineration and open burning is not practiced and air quality has been improved.

The conclusions reached for the cities studied are that both cost pressure due to the increasing price of satisfying labor demands and the enforcement of strict air pollution laws have been principally responsible for the current shifts in solid waste management systems. These perturbations have occurred primarily in large urbanized municipalities because of the delicate balances which exist in these areas, but it is clear that the effects will start to be felt by communities of all sizes as the driving functions become more intense.

VII-C. FINANCING LIMITS RESULTS IN SEEKING THE PRIVATE SECTOR

Cities throughout the nation are experiencing the same general cost pressure being experienced by all segments of the economy due to inflation, wage pressure, etc. In addition, capital financing through conventional mechanisms is becoming more difficult. The city as a corporation has, in many cases, reached its debt ceiling and is legally and practically unable to borrow more money for municipal services. At the same time, it may have reached its statutory tax ceiling and, therefore, is unable to raise revenues through taxation. These events cause a financial crisis.

Such a financial crisis was reached in Minneapolis when it reached its tax limit in 1970 and was forced to seek private sector solutions to both collection and disposal problems. Since the disposal function is capital-intensive, it is especially vulnerable to financing limits. In Minneapolis, the city provided two former incinerators for conversion to transfer stations, but the disposal contractor paid the cost of conversion, set-up, and operations. A similar case occurred in Milwaukee where the decision was made to contract to a private firm. Here the firm also paid the cost of converting incinerators to transfer stations.

The decision of Milwaukee and Minneapolis to turn to the private solid waste industry as a means of expanding their financial capacity (and achieving other objectives) is representative of a strategy that is being adopted or being considered for adoption by many cities in the U.S. today. Such a strategy for coping with the financial pressures on solid waste systems is being complemented by the growing financial capacity of the private solid waste industry as the result of agglomeration of smaller firms into larger, national firms that compete well in private financial markets and promulgate public stock offerings that have been remarkably successful.

Other cities are selecting other options than utilization of the private sector to perform services and provide the capital costs of those services. Some areas are turning to regional authorities (such as the regional authority in Des Moines) that have their own taxing (or fee charging) and bonding authority, as a method not only of rationalizing solid waste services, but of acquiring new sources of financing. Some

cities are tapping private capital sources through lease arrangements with third parties. Others are implementing user charges for solid waste services, moving the costs of such services out of general municipal revenues (e.g., property taxes) and placing solid waste services on a self-sustaining basis comparable to methods for financing the provision of other public services such as water, gas and electricity.

By way of summary, it is clear that environmental and cost pressures on local governmental jurisdictions is having a two-fold impact on solid waste services -- implementation of efficiency measures to increase productivity (and reduce or hold down costs) and development of new institutional arrangements that can expand local financing capacity. Such innovation, where it has occurred, underscores the capacity of local governments to ably respond to a variety of problems in the solid waste area.

VIII

EFFICIENCY VERSUS EMPLOYMENT OPPORTUNITIES

When viewed as an environmental and economic system, solid waste management must operate within environmental quality and efficiency standards. It is clear, however, that many public systems have historically pursued -- either by design or by default -- a third objective: to provide jobs, primarily at the unskilled level. Hiring, personnel management, work requirements, and other policies exist, which, when examined critically, are designed to increase employment at the expense of efficiency.

Certain base statistics also demonstrate the effects of these policies. These are primary indicators of efficiency in collection activities. These indexes of efficiency are men per truck, tons per man per day, and tons per truck per day. Presented here are the public sector averages across all cities, the private sector averages across the nation, and some examples of public sector extremes from the case studies associated with this study.

	PUBLIC MEAN	PRIVATE MEAN	CASE STUDY PUBLIC SYSTEMS
MEN PER TRUCK	2.5	1.6	3.0 - Minneapolis, Tacoma 4.0 - Milwaukee 4.5 - Atlanta
TONS PER MAN PER DAY	3.0	6.1	2.5 - Fort Worth 2.0 - Minneapolis 1.9 - Tacoma 1.6 - Milwaukee 1.3 - Atlanta
TONS PER TRUCK PER DAY	7.6	9.1	5.7 - Tacoma 6.1 - Minneapolis 6.5 - Milwaukee 7.4 - Fort Worth 5.6 - Atlanta

There are, of course, many variables that affect these statistical comparisons. When all are considered, the differences are probably not as stark as illustrated here. Obviously, the public means are better than the public extremes and, therefore, many cities are more efficient than the public norm. Some public operations are also more efficient than many private systems and equally as efficient as the best private systems. However, the public system usually suffers by most measures when compared to the private sector.

Unskilled solid waste manpower is, of course, only one segment of the overstaffing process. As more unskilled laborers are employed, the number of collection crews is generally increased. Thus, the number of skilled laborers (truck drivers) and the number of trucks (capital expense) required also increase. Further, overhead, or indirect support, is usually constant at a level of about 25 percent of the direct workforce, regardless of size. As a result, indirect personnel (supervisors, managers, personnel, payroll, and clerical, etc.) is also inflated.

Many examples exist which indicate that a significant proportion of the public systems compromise efficiency with employment opportunities as an alternate to unemployment and relief. Discussions with managers of municipal systems, (many of whom candidly admit that job support is one of their primary objectives), and the recent experiences of several municipal systems also underscore the job support objective of public solid waste systems. Some examples:

-- The city of Cleveland has taken steps over the last several years to reduce its workforce while maintaining the same level and quality of service. This reduction in workforce was necessitated by the financial difficulties of the city. In 1969, the city operated 224 routes with six man crews -- a total collection workforce of 1,344. By June of 1972, the city was operating 138 routes (covering the same area of the city) with three man crews for a total workforce of approximately 594, an overall reduction of 750 employees in three years.

-- In St. Petersburg, Florida, the sanitation department attempted to cut to 41 three man crews from 45 because of overstaffing but was forced back to the original 45 because of pressures from the labor force (non-unionized)and the city manager's office.

-- In River Rouge, Michigan, a study revealed that the residential workforce of 18 men was overstaffed by 6 to 9 men. It was demonstrated that with the conversion from 55 gallon drums to plastic sacks and other revisions that the workforce could be reduced to 4 men, with 2 trucks instead of 6. But, when the conversion took place, the compromise between the Mayor;s office (efficiency) and the labor union (jobs) was 6 men, 2 trucks.

Another large city, which has asked to remain unnamed for purposes of this study and report, recently had a labor strike in which 75 percent of its collection force walked off of the job for six weeks. The fact that the remaining 25 percent was able to handle the same workload without paying any overtime clearly indicates that the workforce is larger than necessary to accomplish its assigned tasks. Although the city recognizes this situation, it feels that it cannot take steps to reduce its workforce because no other jobs for its unskilled workforce exist in the city and because of its relationship with the labor union.

According to evidence gathered as part of the background study for this report, the objective of providing employment opportunities usually survives until the solid waste system is constrained by budgetary limitations. At the same time, when budgetary limitations are reached and corrective actions are necessary, absolute efficiencies are not achieved. Rather, some mid-ground between efficiency and job support is the more likely result. Cleveland, for example, could have reduced its workforce more than it did without affecting the level and quality of its service.

It is also clear the the "employment opportunity" objective also operates in some private sector systems, even though it is more prevalent in the public sector. Causal factors for overstaffing in the private sector center around ethnic hiring patterns in some companies, family owned businesses, and profit margins in some situations which reduce incentives for absolute efficiency.

The basic policy question to be faced in this area concerns the public sector's role as an employer of last resort or as a transitional employer of the unskilled or disadvantaged.

Priority on efficiency could reasonably be expected to reduce the total employment in the public sector by 20,000 and effect direct cost savings of $100-200 million per year on a national basis. Restructuring of the work requirements could conceivably double the above estimates.

The trade-off involved here, however, is incredibly complex. System improvements (efficiencies) result in substantial cost savings primarily through reductions in labor force requirements. The Environmental Protection Agency encourages communities to implement these collection savings to free up funds for the development of environmentally sound disposal facilities. Such savings and environmental improvements, however, must be compared to the social costs of eliminating jobs for the unskilled. When labor costs are high, direct welfare or retraining costs are probably cheaper, but indirect social costs (i.e., what happens to the specific worker) must also be considered. In the case of Cleveland, a telephone survey by the Public Works Department of 300 of those who lost their jobs in Cleveland's economy move revealed that only 1.7 percent had found jobs (.3 percent full-time jobs), 33 percent had not found employment elsewhere since being laid off one to two years before, and the remaining 65 percent could not be contacted.

Whatever the outcome of this issue, it is clear from experience that it is a local one, and any decisions made along these lines will have to be made at the local level in light of local conditions, problems and needs.

IX

TRAINING

IX-A. LOCAL OPERATING LEVEL

Tasks Performed

As indicated in previous chapters, 99 percent of the jobs in the solid waste industry are at the local level in operating agencies and institutions responsible for managing the nation's solid wastes. These agencies utilize a large number of skilled workers (44 percent),[1] a smaller number of unskilled workers (37 percent), and an even smaller number of supervisory, clerical managerial personnel (5 percent, 5 percent, and 9 percent respectively).

Unskilled workers are primarily involved in moving solid waste from storage areas, where it is stored in a variety of containers, to a collection vehicle. Training for these tasks is minimal, centering mainly around how to lift heavy containers and how to operate lifting and compaction components of collection equipment without injury.

Skilled workers are found at several points in the waste management stream: collection truck drivers, heavy equipment operators at transfer stations, landfills and incinerators, and technical landfill and incinerator personnel. Unlike the unskilled category, significant prior training is required to perform various tasks associated with jobs at the skilled level -- to drive a truck, operate bulldozers or cranes, etc. -- and acquisition of a job in this category is dependent upon having received such training.

Tasks at the supervisory level are those connected with the day-to-day operation of a solid waste system: deploying crews and equipment in a timely fashion on assigned routes, checking to see that all work is performed, rearranging routes or crews to account for missing workers or inoperable equipment, and so forth. Skills required at this level have more to do with the management of men and equipment within different parameters than with the technical skills of a truck driver or a bulldozer operator, even though a supervisor is normally expected to be proficient in the operation of equipment used by those under his supervision.

Managerial level personnel have some supervisory responsibilities, but spend the majority of their time in such functions as budgeting, financial management, equipment procurement, planning, billing, quality control, etc. Skills required at this level are

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[1] Skilled workers includes vehicle drivers.

those conncected with a regular business enterprise. In small operations, these tasks are usually performed by a single person (who may also be a supervisor and a truck driver). In large systems, there is a management team supported by engineers, financial and systems analysts, accountants, personnel experts, etc.

Training

Training at the local level is of two types: on-the-job and off-the-job. On-the-job is both formal and informal, involving formal instruction in the performance of a specific tasks and the type of training one receives from working at a job and learning, through experience, various aspects of the job.

Training provided at the unskilled level is largely on-the-job training. Off-the-job training is provided to some degree at the skilled level when persons need training in the operation of specific types of equipment, even though people at this level usually acquire such skills by being on the job at the unskilled level or prior to going to work in a solid waste system. Formal off-the-job training does not occur to any significant degree, however, until one reaches the supervisory level. Supervisors and managers receive special short courses and seminars on various elements of solid waste management.

Frequently mentioned was the need for improved safety practices among unskilled workers. Current training to address this problem consists of on-the-job training for the most part, and this usually occurs immediately after a new employee begins his job. Some agencies and companies are reinforcing this training periodically, but many are not.

Approximately 85 percent of all employees receive some on-the-job training. Of those who receive such training, a foreman or supervisor is the main person involved in providing such training, and the percent of employees receiving on-the-job training from a foreman or supervisor increases as the job level increases.

The number of days of on-the-job training varies by job level, with supervisors receiving more days of training than skilled and unskilled workers. The median period of on-the-job training for skilled and unskilled workers at the beginning of employment is 2 - 5 days, but for supervisors the median is 6 - 10 days. This small amount of "skill-type" training reflects current management's view that extensive training of this type is not necessary. Thirty-seven percent of the supervisors receive 20 or more days of on-the-job training. The only significant coorelation between on-the-job training and advancement emerges at the supervisory level. On-the-job training for supervisors correlates with several indices of promotion, indicating that promotions and promotion frequency are related to training for this job level.

The incidence of off-the-job training is low for all job levels except supervisors, one-fourth of which receive off-the-job traiing. The small numbers of unskilled and skilled workers receiving off-the-job training largely reflects the fact that such instruction is not mandatory at these job levels. On-the-job training appears to be sufficient to train most persons to perform tasks at these levels. In addition, many of the skills (truck driving, bulldozer operations, etc.) are picked up somewhere else and brought into solid waste management when a person is hired. In the view of landfill operators, traning is not needed to perform their tasks. However, in light of new federal guidelines which call for more stringent operating practices, additional training may be required for proper landfill operation. Off-the-job training, when provided, is most frequently conducted by an outside specialist (see below) or firm, and lasts from 6 - 10 days, and is directed toward supervisors.

In summary, with the exception of safety training and possible landfill operation training there is apparently no need for a formalized training program for unskilled and skilled employees. At the supervisory level, off-the-job training is currently being provided at the expense of the employer or equipment manufacturers for such things as safety and new equipment maintenance practices. At the management level there is a definite need for more sophisticated management practices. The techniques, such as route balancing and the use of information systems might be delivered through a generalized training program. However, improvement in general management practices can best be conveyed through management assistance since they do not lend themselves to generalized application. Such policies as improving labor-management relations, establishing a franchising system, writing a contract with a private firm, negotiating for a land disposal site, etc. would need to be conveyed through technical assistance since their application would be different for each city.

IX-B. STATE LEVEL

Tasks Performed

Discussions in previous chapters have underscored the low level of solid waste activity at the State level in virtually every State. This low level of activity is translated into few jobs at these levels (both in terms of numbers and variety), which in turn impacts on both the need for and the ability to provide training at the State level.

At the current time one can find a wide range of skills being utilized at the State level, including engineers, planners, economists, public administrators, public health administrators, lawyers, systems analysts, etc. With a few exceptions (e.g., Pennsylvania and Wisconsin) however, such a range does not exist in each State. Rather, some States have a public health administrator and a planner; some have a public administrator and a lawyer; others have only a public health administrator. The type of skills utilized in each State is a function of the role of each State in solid waste management; the smaller the role, the fewer the number of people and the range of skills associated with that State.

Training

Little formal training exists at the State level. When a State moves into an area (e.g., standards and enforcement), normally it seeks persons with skills necessary to operate a program in the areas defined by the State. Almost without exception, it finds those persons outside of solid waste management. Planners are hired, for example, with the expectation that their skills can be transferred to the solid waste field through on-the-job experiences and training. The same is true for economists, engineers, systems analysts, and so forth. Virtually the only people hired at the State level with prior solid waste experience are public health administrators.

Formal training for persons with skills applicable to solid waste management is not widely practiced. As indicated before, most of the training comes from being on the job and applying skills to a new subject area. Only 20 percent of persons in these categories actually receive formal training, given largely by specialists in the area of private firms on a contract basis (see below).

In the event that strong State regulatory programs are legislated that include standard setting, surveillance, and enforcement, additional new skills would be required. Some of these skills could be transmitted to current employed people -- others would require that new people be hired. At the professional and managerial level these skills relate to legal interpretation, litigation, chemical analysis, geological analysis, engineering evaluation of disposal site design, etc. At the supervisory and skilled worker level, these skills would consist of inspection of incoming wastes, site inspection, land surveying, etc.

Until regulatory programs are specified in detail, it is not possible to identify all of the skills needed. However, it will be more economical to "buy" many of these skills from local consulting firms than for the States to provide them in-house. Each State will have to make these trade-offs individually.

In addition to the added manpower requirement posed by a new regulatory program, there will be a decreased manpower requirement in some of the program areas now supported by the Federal government that could be deemphasized under new legislation. Therefore, new legislation can be expected to cause both new training demands, and the cessation of some existing demands, to be specified when the legislation is finalized.

IX-C. RESOURCE RECOVERY

There are four basic categories of employees required in the resource recovery field: (1) unskilled; (2) skilled; (3) supervisory and (4) managerial personnel.

Like unskilled personnel in the non-resource recovery areas at the local level, unskilled personnel in the resource recovery area are involved in the movement of materials from storage areas to recovery sites, a task learned from minimal on-the-job training and experience. Skilled personnel are involved in the operation of handling and processing equipment (cutters, balers, shredders, cranes, etc.). These skills are developed both through on-the-job training and through acquiring the skills (when comparable) somewhere else and bringing them into a recovery operation. A special group under skilled personnel are sorting personnel who are highly skilled, but the nature of the skill is such that can only be developed through experience on-the job. The longer one performs the sorting task the more proficient he becomes.

IX-D. FORMAL TRAINING RPOGRAMS

It is clear that solid waste management involves many tasks that can be learned through on-the-job training and through experience and a smaller number of tasks that require special training (e.g., engineering, economics, systems analysis, administration, etc.). In the latter area, skills can be developed apart from solid waste systems and applied -- either through training or through experience -- to solid waste systems when such jobs exist.

Many of the tasks, however, particularly at the skilled level and above, can be enhanced by formal training. As a result, a variety of training efforts have been developed in recent years to take advantage of this enhancement potential. This development has occurred in three places: the Federal government, associations, and private industry.

Federal Training Efforts

Solid waste training efforts in the Federal Government are conducted by the Office of Solid Waste Management Programs of the Environmental Protection Agency and the Bureau of Mines of the Department of the Interior. EPA's training program includes:

-- University grants and fellowships: This effort supports curriculum development, academic training at the undergraduate and graduate level, and short course development and implementation within the university/college context. To date, training grants have been established at eleven universities that offer a master's degree in engineering with a major in solid waste management. In 1971, approximately 80 students were supported and trained through this program and approximately 175 students took courses developed by this program. Other universities are beginning to offer similar academic programs, largely with their own funds and resources.

-- State training grants: EPA is currently supporting the training of solid waste personnel at State and local levels through grants to State agencies responsible for handling training needs within their jurisdictions. Twelve States presently have training grants and are using both Federal funds and training material to provide short (1 - 4 days) courses in solid waste management, landfills, incineration, and planning. These courses are offered to operational and management personnel in the local operating agencies as well as to State planners. Approximately 1,000 persons have received training through this mechanism to date.

-- Direct training: EPA has developed short courses in various areas of solid waste management, including managerial courses, sanitary landfills, incineration and planning. Similar to the material provided to States to use in their own training programs, it is delivered to persons at all levels through short courses throughout the U.S. on an annual basis. Approximately 1,500 persons have been involved in this program to date.

-- Safety training: EPA has recently completed in conjunction with development and begun implementation of a special course in safety training, primarily for unskilled and skilled collection, sanitary landfill. Entitled "Mission Responsible," the program will be disseminated to States, local agencies (public and private) and associations in an attempt to reduce the industry's abnormally high accident rates.

The Bureau of Mines is currently in the process of giving grants to minerals-oriented universities to train professionals at the graduate and undergraduate level in minerals disposal and recovery. Approximately 50 persons have been trained, or retrained as the case may be, through this program to date.

Association Training Efforts

National associations in recent years have moved into the training area, particularly the American Public Works Association and the National Solid Waste Management Association. Utilizing materials developed both in-house and by others and experts drawn from all sectors, these associations have begun to sponsor workshops and seminars at their annual conventions and regional meetings or institutes on all phases of solid waste management, including routing of trucks, equipment procurement, sanitary landfilling, incinerator, labor-management relations, budgeting and accounting, and so forth.

Private Industry

The private sector is involved in the development and provision of basically two types of training efforts. Private collection and disposal firms, particularly larger firms, have begun to provide their own employees with special (as opposed to on-the-job) training in solid waste management.

Equipment manufacturers, notably heavy equipment manufacturers for landfill and incineration, also provide special training programs to those agencies and institutions who purchase their equipment. The costs of this program are reflected in the purchase price of the equipment, and is provided to anyone -- public or private -- who utilizes a company's equipment.

Conclusions

The direct Federal role in training has historically been in the following directions:

- Development and conduct of special courses for orienting people to the solid waste problem.
- Development and conduct of general operating practices courses to be made available to local operating personnel.
- Development of special courses which address special problems (e.g., "Mission Responsible" which address safety).

Indirect training activities consist of financial support of State and university training programs through Federal grants.

The conclusion of the study is that the Federal government (OSWMP/EPA) has a role in the training process, but that it is a limited one. There is no apparent need for delivering training on day-to-day operations to operating agencies nationwide. For the most part, they are already providing such training on-the-job.

The conclusion on the need for EPA-sponsored higher education programs in solid waste is that such programs have a questionable direct payoff. EPA recommends that direct special assistance programs for university training in solid waste be phased out in favor of general educational assistance that is available to all graduate students. Management on operating can be more effectively helped through technical assistance than relying on higher education programs for better trained people.

APPENDIX A

SUMMARY OF MANPOWER STUDY METHODOLOGY

The manpower study conducted by the Environmental Protection Agency in preparing this report and responding to the Congressional mandate contained in Section 210 of the Solid Waste Disposal Act of 1965, as amended, consisted of two basic parts: (1) a comprehensive nationwide survey and (2) seven case studies.

The nationwide survey centered around two personal interview questionnaires: one for management and one for employees. The former stressed the gathering of factual information (records, wages, absenteeism, etc.) while the latter focused more on attitudinal issues. In implementing the questionnaires, EPA and its contractor first determined the universe of state, county, and municipal government agencies involved in solid waste management along with the universe of private contractors. A stratified sample of this universe was taken, the strata being four SMSA sizes and seven geographical regions. For the management questionnaire, the sample was chosen to provide a 90 percent confidence that the sampling error would be less than ±10 percent for regional estimates. For the employee questionnaire, the sample was chosen to provide a 90 percent confidence that the sampling error would be less than ±15 percent.

The actual management sample attained included 2300 private companies and 1100 local government agencies. The actual employee sample included 911 across the nation. Tabular listings of the distributions of these interviews are shown in Figures 1 and 2. Within solid waste management local operations, more than another 1000 contractors and agencies were contacted five or more times, but were not reached for an interview.

Analysis of the data collected in the survey revealed wide disparities in the manpower situation of different solid waste management agencies and systems. Some, for example, had extremely high rates of turnover or absenteeism, while others were low when compared to national norms and other industries. Some systems required twice as many men as others to handle essentially the same workload. Consequently, EPA conducted in-depth case studies of seven solid waste management systems in an attempt to ascertain reasons for the striking manpower differences that exist between different systems. Systems selected for case study analysis were chosen on the basis of criteria designed to ensure examination of different types of systems (public versus private, large versus small, high turnover versus low turnover, etc.) manifesting a variety of manpower strengths or weaknesses. Systems analyzed in the case study phase were:

Atlanta, Georgia
Tacoma, Washington
Minneapolis, Minnesota
Pittsburg, Pennsylvania
Fort Worth, Texas
Hanover, Pennsylvania
Milwaukee, Wisconsin

APPENDIX B

FIGURE IV-1*

MANPOWER DISTRIBUTION BY SUB-CATEGORIES

Job Categories	Number Employed								
				Local Government			Private		
	Total	Percent of Total	Mean Per Agency	Total	Percent of Total	Mean Per Agency	Total	Percent of Total	Mean Per Company
Managerial, Technical, Professional	19,800	8.7	1.45	2,700	2.6	.91	17,800	13.7	1.60
General	19,200			2,400			16,800		
Other	600			300			300		
Clerical, Secretarial	10,900	4.8	.80	2,300	2.3	.77	8,600	6.9	.81
Supervisory, Foremen	11,500	5.1	.84	6,300	6.2	2.11	5,200	4.2	.49
Collection/transportation	9,400			5,100			4,300		
Disposal/other	2,100			1,200			900		
Skilled Laborers	99,800	44.0	7.31	36,200	35.6	12.15	63,600	50.9	5.96
Maintenance	9,000			2,200			6,800		
Collection/transportation	80,000			27,100			52,900		
Disposal/other	10,800			6,900			3,900		
Unskilled Laborers	84,700	37.4	6.21	54,300	53.3	18.22	30,400	24.3	2.85
Collection/transportation	79,900			51,500			28,400		
Disposal/other	4,800			2,800			2,000		
TOTALS	226,700	100.0	16.6	101,800	100.0	34.2	124,900	100.0	11.7

* Only managers who spend 50 percent of their time or more in solid waste management or 75 percent of their time or more in the case of all other employees are included in these figures. Truck drivers are counted as skilled; helpers as unskilled.

FIGURE IV-2

MEAN BASE WEEKLY PAY BY JOB CATEGORY

	MANAGE-MENT	SUPER-VISORY	CLERICAL/ SECRE-TARIAL	SKILLED	MEAN OF SKILLED/ UNSKILLED	UNSKILLED
Public	$186	$146	$114	$125	$115	$108
Private	206	202	114	149	137	113
Total	203	182	114	142	128	111
National Average[1]	198	183	80	NA	120	NA

[1]Statistical Abstracts, median earnings, 1969

FIGURE IV-3

MEAN GROSS WEEKLY PAY BY JOB CATEGORY INCLUDING OVERTIME

	MANAGE-MENT	SUPER-VISORY[1]	CLERICAL/ SECRETARIAL	SKILLED	UNSKILLED	WEIGHTED BLUE COLLAR
Public	$186.00	$157.50	$114.00	$136.25	$110.43	$120.76
Private	206.00	288.36	127.25	190.35	125.71	169.44
Total	203.00	216.47	124.47	170.78	115.94	145.60

[1]It was assumed that supervisory personnel are paid for overtime.

FIGURE IV-4

MEAN WEEKLY BASE SALARY AS A FUNCTION OF SMSA AND COMPANY (AGENCY) SIZE (IN DOLLARS)

		SMSA SIZE				PUBLIC (No. of Employees)					PRIVATE (No. of Employees)				
	Total	Non-SMSA	50,000 499,999	500,000 1,999,999	(+) 2,000,000	Total	1-5	6-9	10-49	50+	Total	1-5	6-9	10-49	50+
Managerial	203	160	177	221	239	186	171	153	181	231	206	168	220	261	296
Clerical	114	100	103	114	128	114	111	112	114	114	114	94	110	117	138
Supervisory	182	148	165	189	214	146	136	157	140	159	202	167	180	207	211
Skilled	142	116	129	147	170	125	121	117	125	137	149	134	147	160	176
Unskilled	111	97	99	111	137	108	117	111	103	110	113	100	112	121	137

FIGURE IV-5

MEAN WEEKLY SALARY BY REGION (IN DOLLARS)

	NORTHEAST	SOUTHEAST	EAST CENTRAL	WEST CENTRAL	SOUTHWEST	ROCKY MOUNTAIN	WEST
Management	200.82	181.78	246.74	182.63	190.72	175.25	198.86
Clerical	117.46	98.69	121.15	113.51	102.67	98.46	116.41
Supervisory	205.20	136.68	214.00	170.04	156.73	165.15	179.61
Skilled	153.45	112.65	152.69	138.85	111.55	137.74	154.75
Unskilled	122.11	84.65	117.35	106.94	94.22	119.71	120.53

FIGURE IV-6

MEAN HOURS PER WEEK WORKED

	SUPERVISORY	SKILLED	UNSKILLED
Public	42.1	42.4	40.6
Private	51.4	47.4	43.0

FIGURE IV-7

NUMBER OF COLLECTION AND DISPOSAL EMPLOYEES
BEING ACTIVELY RECRUITED ON ANY GIVEN DAY

JOB CATEGORY	TOTAL	PUBLIC	PRIVATE
Management Employees	190	60	130
Clerical Employees	140	30	110
Supervisory Employees	160	80	80
Skilled Employees	1,930	500	1,430
Unskilled Employees	1,720	810	910
TOTAL EMPLOYEES	4,140	1,480	2,660

FIGURE IV-8

NUMBER OF COLLECTION AND DISPOSAL
EMPLOYEES TERMINATING PER YEAR

JOB CATEGORY	TOTAL	PUBLIC	PRIVATE
Management Employees	630	250	380
Clerical Employees	1,650	190	1,460
Supervisory Employees	800	510	290
Skilled Employees	17,000	3,100	13,900
Unskilled Employees	35,170	16,720	18,450
TOTAL	55,250	20,770	34,480

FIGURE IV-9

COLLECTION AND DISPOSAL ANNUAL TURNOVER

JOB CATEGORY	TOTAL	PUBLIC	PRIVATE
Management	3.1%	8.8%	2.2%
Clerical	14.9%	8.0%	16.7%
Supervisory	6.9%	8.0%	5.5%
Skilled	16.8%	8.5%	21.4%
Unskilled	40.7%	30.3%	58.9%
TOTAL	23.9%	20.1%	27.1%

FIGURE IV-10

PERCENT OF PEOPLE ABSENT AT LEAST ONE DAY IN PAST SIX MONTHS

	UNSKILLED	SKILLED	SUPERVISORY
Public	58%	56%	39%
Private	52%	46%	20%

FIGURE IV-11

PERCENT OF EMPLOYEES BELONGING TO UNIONS IN PUBLIC AND PRIVATE SECTOR BY JOB LEVEL

	UNSKILLED	SKILLED	SUPERVISORY	MANAGERIAL
Public Employees	48.2%	33.6%	22.5%	21.1%
Base	(114)	(125)	(71)	(19)
Private Employees	36.8%	27.0%	13.0%	11.9%
Base	(212)	(178)	(75)	(42)

FIGURE IV-12

NATURE OF INJURIES

	NUMBER	% OF TOTAL INJURIES	DAYS LOST	% OF TOTAL DAYS LOST
Sprains, Strains	306.00	40.32	4,332.00	51.42
Fracture	18.00	2.37	1,655.00	19.64
Contusion, Bruise, Crushing	123.00	16.21	782.00	9.28
Spinal Disc Problem	5.00	.66	499.00	5.92
Amputation, Avulsion	5.00	.79	294.00	3.49
Hernia	8.00	1.05	243.00	2.88
Cut, Laceration, Puncture	94.00	12.38	172.00	2.04
Not Known, Not Specified	6.00	.79	141.00	1.67
Multiple Injuries	1.00	.13	61.00	.72
Inflammation of Joints, Tendons, Muscles	12.00	1.58	57.00	.68
Concussion	6.00	.79	41.00	.49
Infection	17.00	2.24	31.00	.37
Object in Eye	84.00	11.07	31.00	.37
Burn or Scald, Heat	7.00	.92	27.00	.32
Dermatitis, Rash	9.00	1.19	16.00	.19
Dog Bite	4.00	.53	11.00	.13
Insect Bite	13.00	1.71	8.00	.09
None	2.00	.26	7.00	.08
Scratches, Abrasion	14.00	1.84	6.00	.07
Chemical Burn	17.00	2.24	5.00	.06
Hearing Loss or Impairment	1.00	.13	4.00	.05
Hemorrhoids	1.00	.13	1.00	.01
Contagious or Infectious Disease	2.00	.26	1.00	.01
Heat Stroke, Etc.	2.00	.26	.00	.00
Poisoning, Blood Poisoning	1.00	.13	.00	.00

FIGURE IV-13

TYPES OF ACTIVITIES INVOLVING INJURIES

	NUMBER	% OF TOTAL INJURIES	DAYS LOST	% OF TOTAL DAYS LOST
Sprained Back Lifting Container	60.00	7.91	1,117.00	13.26
Hit or Caught by Blade	12.00	1.58	1,047.00	12.43
Accident not Listed	85.00	11.20	831.00	9.86
Traffic Accident	18.00	2.37	790.00	9.38
Slipped While Dismounting Step	31.00	4.08	704.00	8.36
Trapped Between Truck and Other	17.00	2.24	514.00	6.10
Strained Other Than Back Lifting Container	32.00	4.22	509.00	6.04
Back Strain - No Specific Cause	8.00	1.05	465.00	5.52
Fall While Riding on Step	31.00	4.08	400.00	4.75
Strained Back Dumping Can	29.00	3.82	275.00	3.26
Hernia, No Specific Cause	8.00	1.05	240.00	2.88
Catch Falling Container	20.00	2.64	228.00	2.71
Slipped While Mounting Step	14.00	1.84	165.00	1.96
Hit Arm or Hand on Hopper Edge	16.00	2.14	157.00	1.86
Hit by or Caught on Safety Door	20.00	2.64	124.00	1.47
Hit by Co-Worker's Container	21.00	2.77	109.00	1.29
Tripped on Uneven Surface	8.00	1.05	99.00	1.18
Sprain (Non-Back) While Dumping	21.00	2.77	80.00	.95
Slipped Dismounting Cab	12.00	1.58	74.00	.88
Slipped Mounting Cab	5.00	.66	68.00	.81
Fall, Slippery Surface	14.00	1.84	61.00	.72
Dropped Container on Self	12.00	1.58	54.00	.64
Low Back Strain - No Specific Cause	8.00	1.05	46.00	.55
Solid Material Ejected by Hopper	22.00	2.90	38.00	.45
Puncture Wounds from Shrubbery	34.00	4.48	31.00	.37

FIGURE IV-14

INJURY RATES BY TENURE

	NUMBER	%	DAYS LOST	%
More Than 2 Years	341.00	50.37	4,459.00	54.87
Less Than 6 Months	187.00	27.62	2,565.00	31.57
Six Months to 2 Years	148.00	21.86	1,068.00	13.14
Not Known	1.00	.15	34.00	.42

Figure VII-1

Comparative Public-Private Cost and Productivity Data

Minneapolis, Minnesota

1970

	Cost/Ton*	Monthly* Cost/Stop	Annual* Cost/Stop
City	$43.84	$2.93	$35.16
Private	34.71	2.63	31.56

* Includes collection and disposal.

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